



**FOBOS**  
**GAS EQUIPMENT**

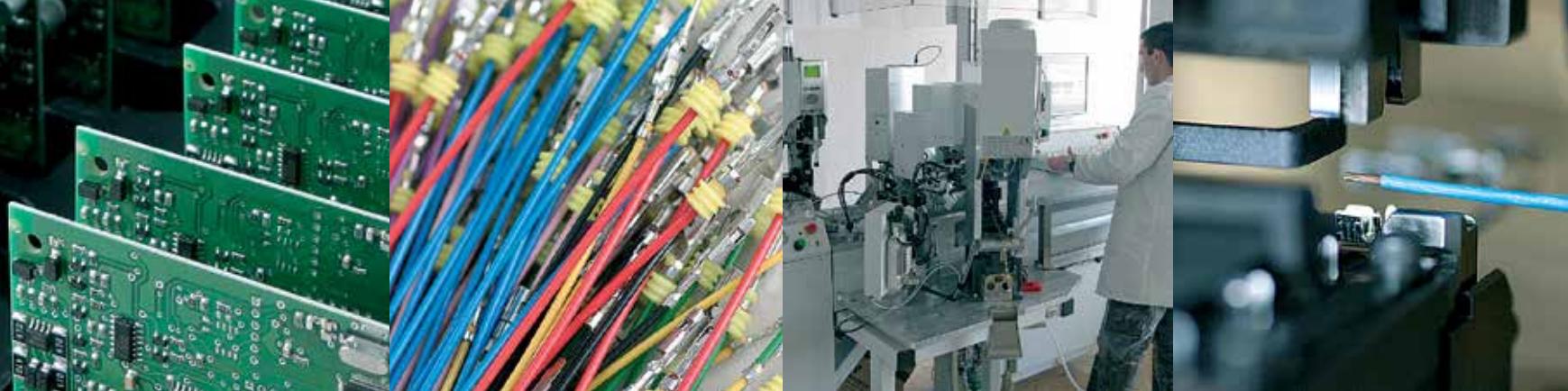


C A T A L O G

2 0 1 4

[www.fobosgas.com](http://www.fobosgas.com)





# HISTORY

Nowadays, Fobos Auto Ltd has the following main activities:

Fobos Auto is leader on the Bulgarian automotive market for over 20 years and is currently one of the largest companies in Bulgaria for gas injection systems. Products offered by Fobos Auto are delivered in more than 15 countries worldwide. In 2013, the company's exports were 65 percent of its total income.

**Fobos Auto's products are sold in Serbia, Greece, Ukraine, Romania, Turkey, Thailand, India and many other countries.**

**The company offers safe, efficient and environment-friendly solutions.**

Company's main objective is providing innovative products with the highest quality on the Bulgarian and international market. Auto Fobos has a partnership network all over Bulgaria. Currently, the network includes more than 70 professional autogas workshops, which benefit from our marketing, technical support and training.

By it's online shop, Fobos Auto offers over 500 vaporized products, including systems for converting vehicles for propane butane and methane.

#### **THE SALES STRUCTURE OF INDIVIDUAL COMPONENTS IS:**

- LPG and CNG products for automotive gas systems.
- Production of cable harnesses and electronics for the automotive industry needs.
- Sales of LPG and CNG components from global OEMs.

The result of extensive experience, engineering and development of R & D activity is the undisputed leadership in the field of alternative fuel systems for motor vehicles.

All prototypes undergo the full range of laboratory tests to assess their reliability in extreme environmental conditions. Tests include: air conditioning, shock, vibration, moisture and corrosion. Then we perform similar tests in actual cars.

Fobos Auto invests in building a modern factory. To provide leadership within the industry, Fobos Auto is constantly developing its machinery and equipment. Retrofitting of machines is done with company funds and co-financing from the EU. The production of Fobos Auto takes place in three workshops: Electronics, SMT, wiring harnesses and mechanical workshop.

The investment projects of Fobos Auto includes the purchase of additional equipment and construction of new production facilities, which will guarantee an increase in the product capacity of the company and maintaining high product quality.

The strategy for success includes optimal use of market potential and intensive development of the company in the production and sales of LPG and CNG components

**ECU set**

# Vendo

Vendo is designed for all vehicles from 1 to 8 cylinder petrol engines and provides precise dosage of fuel, using advanced software, which works with automatic construction of a gas map, which is constantly adjusting to the current parameters of the petrol system, considering the engine's load and RPM. The petrol injectors are operated by relays and transistors.

The body consists of a robust, air proof plastic box. Range of operation from -40°C up to +125°C. Two 24 pin connectors by FCI have been used.

**VENDO GAS ECU HAS THE FOLLOWING EXTRA FEATURES:**

- The Petrol Injectors are driven by relays in cooperation with power MOSFETs;
- Integrated gas injectors power relay;
- Possibility to operate in stand-alone (non-sequential) mode - for mechanical fuel injection system;
- Microcontroller with enhanced capabilities.

**From 1 to 8 cylinders** **OBD II**

#### Combined sensor

A temperature sensor which monitors the temperature of the vaporized gas, and a sensor for the fluxional pressure of the vaporized gas, which monitors the pressure within the system and provides the necessary data to the gas ECU.



#### Harness 2 ECU

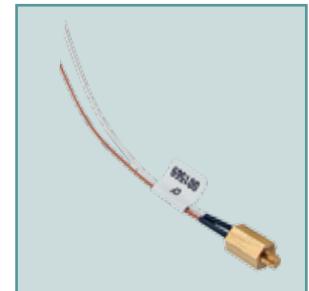
The harness of VENDO gas injection system consists of a bundle of insulated tubing and FCI and AMP connectors. Every single cable is wrapped up in insulated tubing.



## ECU VENDO Components

#### Sensor temperature

Monitors the temperature of the cooling liquid in the reducer.



#### Change-over switch

Changeover switch installed in the cabin at a comfortable place for the driver. By pressing it changes to the desired mode - Turbo, Normal or Economic. The automatic switch allows manual and automatic mode of work. It indicates also the fuel level in the tank.



## HIGH-END ECU SET

# Fobos 1

**Fobos 1 ECU** is designed in a way to work in a busy environment. The body consists of a robust, air-proof aluminum frame.

What distinguishes our system from its competitors is high reliability, due to the use of high-technology components that were designed especially for automotive use.

The main signals used in the process of control are: temperature of the cooling flow inside the reducer, temperature and pressure of the gas after the reducer, R.P.M., condition of the petrol injectors, pressure inside the intake manifold, two oxygen sensors, pressure inside the accumulator, gas/petrol switch over and the amount of gas inside the tank.

**From  
1 to 8  
cylinders**

**OBD II**



ECU Fobos 1 Components



Combined sensor



Harness 1 ECU



Sensor temperature



Change-over switch

A brochure for the Fobos 2 Professional ECU Set. The top half features a green background with the text 'ECU set' and a '3 years warranty' badge. The middle section is dark teal with the text 'PROFESSIONAL ECU SET', 'From 1 to 4 cylinders', and 'OBD II'. The bottom section shows a black plastic housing for the ECU with a blue label that reads 'FOBOS GAS EQUIPMENT LPG/CNG GAS INJECTION SYSTEM Fobos 2'. It has a metal connector at the bottom and a ribbed top cover.

Combined sensor

A temperature sensor which monitors the temperature of the vaporized gas, and a sensor for the fluxional pressure of the vaporized gas, which monitors the pressure within the system and provides the necessary data to the gas ECU.



Harness 2 ECU

The harness of FOBOS gas injection system consists of a bundle of insulated tubing and FCI and AMP connectors. Every single cable is wrapped up in insulated tubing.



ECU Fobos 2 Components

Sensor temperature

Monitors the temperature of the cooling liquid in the reducer.



Change-over switch

Changeover switch installed in the cabin at a comfortable place for the driver. By pressing it changes to the desired mode - Turbo, Normal or Economic. The automatic switch allows manual and automatic mode of work. It indicates also the fuel level in the tank.



## BUDGET ECU SET



**Fobos 4**

**Fobos 4 ECU** based on Fobos 2, with a much smaller box and only one 24 pin connector of FCI, maintains full functionality and supports 3 and 4 cyl. aggregates.

**From 1 to 4 cylinders**

**ECU set**

**3 years warranty**



### ECU Fobos 4 Components

#### Sensor temperature

Monitors the temperature of the cooling liquid in the reducer.



#### Change-over switch

Changeover switch installed in the cabin at a comfortable place for the driver. By pressing it changes to the desired mode - Turbo, Normal or Economic. The automatic switch allows manual and automatic mode of work. It indicates also the fuel level in the tank.



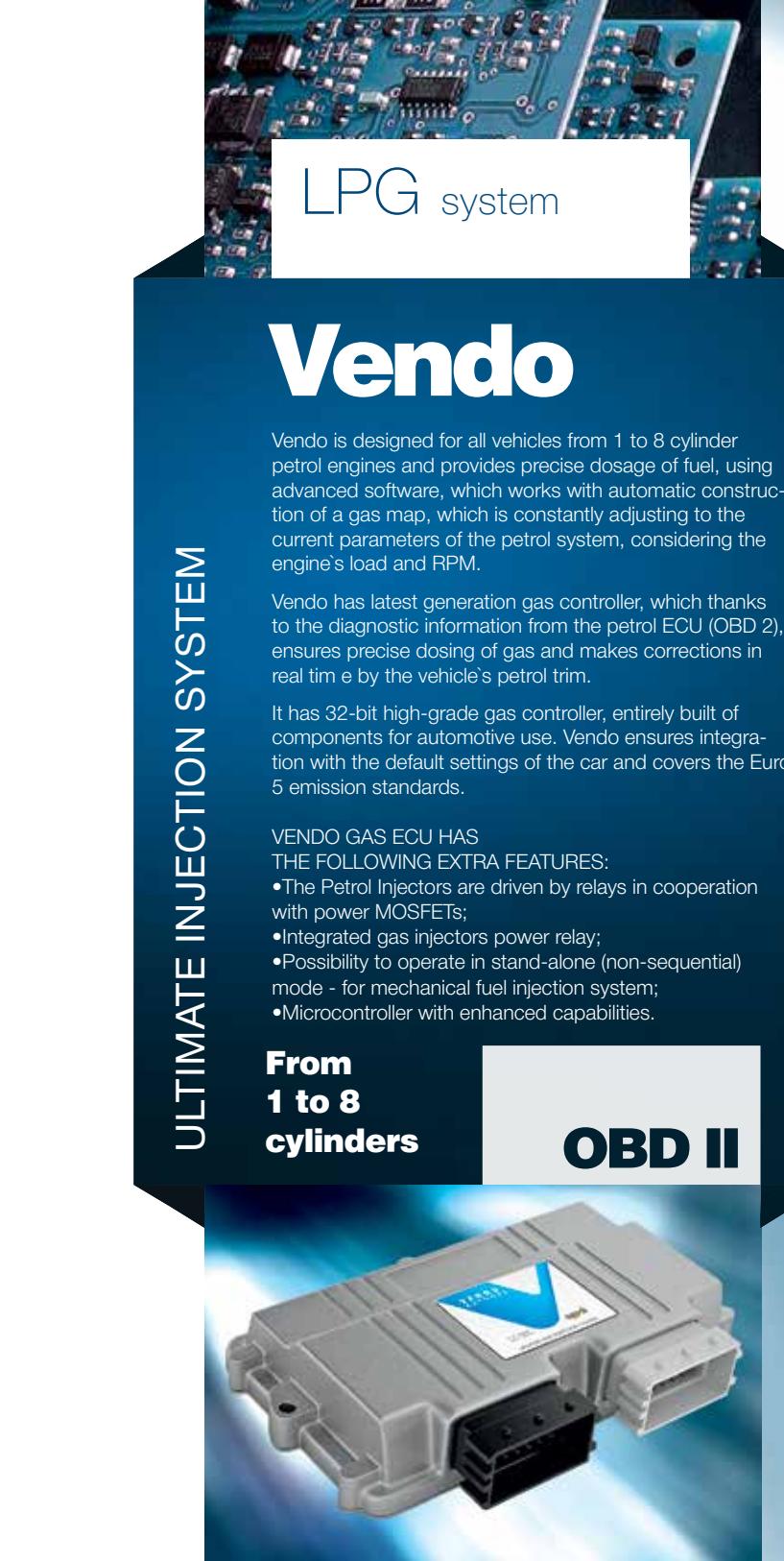
#### Combined sensor

A temperature sensor which monitors the temperature of the vaporized gas, and a sensor for the fluxional pressure of the vaporized gas, which monitors the pressure within the system and provides the necessary data to the gas ECU.

#### Harness 4 ECU

The harness of FOBOS gas injection system consists of a bundle of insulated tubing and FCI and AMP connectors. Every single cable is wrapped up in insulated tubing.

## ULTIMATE INJECTION SYSTEM



**Vendo**

Vendo is designed for all vehicles from 1 to 8 cylinder petrol engines and provides precise dosage of fuel, using advanced software, which works with automatic construction of a gas map, which is constantly adjusting to the current parameters of the petrol system, considering the engine's load and RPM.

Vendo has latest generation gas controller, which thanks to the diagnostic information from the petrol ECU (OBD 2), ensures precise dosing of gas and makes corrections in real time by the vehicle's petrol trim.

It has 32-bit high-grade gas controller, entirely built of components for automotive use. Vendo ensures integration with the default settings of the car and covers the Euro 5 emission standards.

VENDO GAS ECU HAS THE FOLLOWING EXTRA FEATURES:

- The Petrol Injectors are driven by relays in cooperation with power MOSFETs;
- Integrated gas injectors power relay;
- Possibility to operate in stand-alone (non-sequential) mode - for mechanical fuel injection system;
- Microcontroller with enhanced capabilities.

**From 1 to 8 cylinders**

**OBD II**

**LPG system**

**TUV** **CE** **ECE R10** **ECE R12** **ECE R14**



Certificate  
№ 67 R

## HIGH-END GAS INJECTION SYSTEM



LPG system

## Fobos 1

Fobos 1 is designed for all vehicles from 1 to 8 cylinder petrol engines and provides precise dosage of fuel, using advanced software, which works with automatic construction of a gas map, which is constantly adjusting to the current parameters of the petrol system, considering the engine's load and RPM.

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From  
1 to 8  
cylinders

OBD II



Certificate  
№ 67 R-014542



## PROFESSIONAL INJECTION SYSTEM



LPG system

## Fobos 2

Fobos 2 is designed for all vehicles from 1 to 4 cylinder petrol engines and provides precise dosage of fuel, using advanced software, which works with automatic construction of a gas map, which is constantly adjusting to the current parameters of the petrol system, considering the engine's load and RPM.

Fobos 2 has latest generation gas controller, which thanks to the diagnostic information from the petrol ECU (OBD 2), ensures precise dosing of gas and makes corrections in real time by the vehicle's petrol trim.

It has 32-bit high-grade gas controller, entirely built of components for automotive use. Fobos 2 ensures integration with the default settings of the car and covers the Euro 5 emission standards.

From  
1 to 4  
cylinders

OBD II



Certificate  
№ 67 R-014542



## BUDGET INJECTION SYSTEM



LPG system

# Fobos 4

Fobos 4 is designed for all vehicles from 1 to 4 cylinder petrol engines and provides precise dosage of fuel, using advanced software, which works with automatic construction of a gas map, which is constantly adjusting to the current parameters of the petrol system, considering the engine's load and RPM.

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From  
1 to 4  
cylinders

OBD II

Certificate  
№ 67 R-014542



## ULTIMATE INJECTION SYSTEM



CNG system

# Vendo

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VENDO GAS ECU HAS  
THE FOLLOWING EXTRA FEATURES:

- The Petrol Injectors are driven by relays in cooperation with power MOSFETs;
- Integrated gas injectors power relay;
- Possibility to operate in stand-alone (non-sequential) mode - for mechanical fuel injection system;
- Microcontroller with enhanced capabilities.

From  
1 to 8  
cylinders

OBD II

Certificate  
№ 110 R



## HIGH-END GAS INJECTION SYSTEM



CNG system

## Fobos 1

Fobos 1 is designed for all vehicles from 1 to 8 cylinder petrol engines and provides precise dosage of fuel, using advanced software, which works with automatic construction of a gas map, which is constantly adjusting to the current parameters of the petrol system, considering the engine's load and RPM.

Fobos 1 has latest generation gas controller, which thanks to the diagnostic information from the petrol ECU (OBD 2), ensures precise dosing of gas and makes corrections in real time by the vehicle's petrol trim.

It has 32-bit high-grade gas controller, entirely built of components for automotive use. Fobos 1 ensures integration with the default settings of the car and covers the Euro 5 emission standards.

From  
1 to 8  
cylinders

OBD II



Certificate  
№ 110 R-005668



## STANDARD INJECTION SYSTEM



CNG system

## Fobos 2

Fobos 2 is designed for all vehicles from 1 to 4 cylinder petrol engines and provides precise dosage of fuel, using advanced software, which works with automatic construction of a gas map, which is constantly adjusting to the current parameters of the petrol system, considering the engine's load and RPM.

Fobos 2 has latest generation gas controller, which thanks to the diagnostic information from the petrol ECU (OBD 2), ensures precise dosing of gas and makes corrections in real time by the vehicle's petrol trim.

It has 32-bit high-grade gas controller, entirely built of components for automotive use. Fobos 2 ensures integration with the default settings of the car and covers the Euro 5 emission standards.

From  
1 to 4  
cylinders

OBD II



Certificate  
№ 110 R-005668



## BUDGET INJECTION SYSTEM



CNG system

# Fobos 4

Fobos 4 is designed for all vehicles from 1 to 4 cylinder petrol engines and provides precise dosage of fuel, using advanced software, which works with automatic construction of a gas map, which is constantly adjusting to the current parameters of the petrol system, considering the engine's load and RPM.

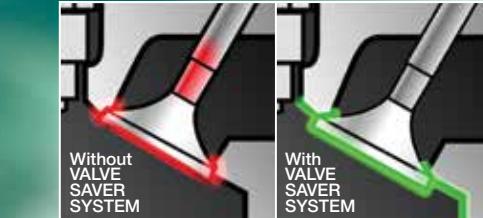
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From  
1 to 4  
cylinders



Certificate  
№ 110 R-005668



LPG/CNG  
system

# V -LUBE

## VALVE SAVER SYSTEM

### WHY TO CHOOSE A VALVE SAVER KIT

LPG and CNG are the cheapest fuels of the future. Their price is lower than the petrol, they do not contain sulfur and lead and reduces the pollution of the environment.

However they have one drawback - they are "dry burning fuel" and they haven't got the lubricating properties of the gasoline, this leads to premature wear and damage of the valves and valve's seats. To avoid this it is necessary to use a system that protects the valves and their seats - V-LUBE VALVE SAVER

The liquid V-LUBE VALVE SAVER ADDITIVE is high temperature grease, specially designed and certificated to reduce the wear and tear of the valves and their seats for cars powered by LPG and CNG.

**V > L U B E**  
LPG VALVE SAVER - ADDITIVES - TECHNICAL SPRAYS



## COMPARISON CHART OF GAS INJECTION SYSTEM

**LPG/CNG**  
systems



## Function

	<b>Fobos 1</b>	<b>Fobos 2</b>	<b>Fobos 4</b>	<b>VENDO</b>
Compatible to work on LPG and CNG	●	●	●	●
Aluminum, water-resistant housing	●			
Plastic, water-resistant housing		●	●	●
The Gas ECU include for car use 32 bits micro processor NEC with built-in CAN controller	●	●	●	●
Programmable Output	●	●		●
Smart change-over switch with light indicator for gas system maintenance reminder, built-in buzzer and connector	●	●	●	●
The Petrol Injectors are driven by relays in cooperation with power MOSFETs				●
Built-in hardware protection and diagnostic of Sensor's Voltage	●	●		●
Auto-adjustment according to gas temperature and pressure	●	●	●	●
Adjust the mixture ratio according to current parameters of the Petrol ECU	●	●	●	●
Built-in protection for emergency engine stop engine and gas flow stop	●	●	●	●
Additional user manual tune settings according to the temperature and pressure of the gas	●	●	●	●
Integrated gas injectors power relay		●	●	●
Additional user manual tune settings according to car battery accumulator voltage	●	●	●	●
Smart automatic changeover switch into petrol if gas is running out. Feature help to detect the False Signals for gas running out	●	●	●	●
Automatic changeover switch into gas when reach the required operational parameters	●	●	●	●
Track and Delete Error Logs in the Gas ECU Memory	●	●	●	●
Integrated system for self diagnostic	●	●	●	●
Auto Adaptation System based on the petrol injection - Gas Trim	●	●	●	●
Availability Simultaneous Injection of gas and petrol injectors in percentage ratio	●	●	●	●
Possibility to connect External Diagnostic Tools after connecting the OBDII	●	●	●	●
Communication with EOBDII of the car by CAN, K-line , L-line	●	●		●
Adjustments by EOBDII , delete error logs and petrol diagnostic	●	●		●
Injection Adjustment for CUT-OFF	●	●	●	●
Independent adjustment of the injectors on bank 1 and bank 2	●			●
Overwork the additional impulses - asynchronous enrichment	●	●	●	●

## COMPARISON CHART OF GAS INJECTION SYSTEM

**LPG/CNG**  
systems



## Function

	<b>Fobos 1</b>	<b>Fobos 2</b>	<b>Fobos 4</b>	<b>VENDO</b>
Filtering the RPM Signals	●	●	●	●
Three work modes - Standard, Economy, Increased power	●	●	●	●
Overwork the Petrol Signals: sequential, semi - sequential and full group car engines	●	●	●	●
Improved car engine control of petrol injection systems: semi-sequential and full group	●	●	●	●
Automatically Detect filling type : sequential, semi-sequential and full group	●	●	●	●
Improved control give ability of 3 Ohm Injectors to work with Full Group Engines	●	●	●	●
Maximum Overload Setting wherat car is able to work on gas even the differences in RPM	●	●	●	●
Complete diagnostic with built-in oscilloscope	●	●	●	●
Possibility to operate in stand-alone (non-sequential) mode - for mechanical fuel injection system	●			
Ability to convert standard and turbocharged engines	●	●	●	●
Feature Mazda™ Leanring	●	●	●	●
Ability to convert cars with Rennicks injection systems	●	●	●	●
Ability to convert cars with mechanical injection systems	●			
Automatically update of the software after connecting to the Internet	●	●	●	●
Emergency Start on gas	●	●	●	●
Check for exchanged cables of gas injectors	●	●	●	●
Ability to "exchange the cables" using software	●	●	●	●
Automatic calibration and alignment injection of gas injectors	●	●	●	●
Microcontroller with enhanced capabilities				
Check and Manual Calibration Injection of Gas Injectors	●	●	●	●
Built-in protection for Cold Start on gas	●	●	●	●
Built-in protection from freezing of the Reducer when the Coolant level is low or reduced	●	●	●	●
Maintaining key engine performance parameters HP, torque, RPM on exacty	●	●	●	●
The Hermess include only original connectors and terminals by TE and PCI	●	●	●	●
Ability manualy to adjust all parameters	●	●	●	●
The Gas ECU has been made from components certificated only for car use	●	●	●	●
Intuitive Quick System Configuration Wizard Window	●	●	●	●

## MULTIVALVES

LPG system

# Multivalves

Fobos Auto Ltd uses multivalves from one of the largest companies in the world that produces gas equipment - OMB.

The multivalves are compatible with the following types of tanks: Cylindrical 30°; Cylindrical 90°; Toroidal 0°; Toroidal 30° and Toroidal 37°.

They are equipped with a thermal safety handheld tap, gas filter, check valve, excess flow valve and a device that takes into account overpressure and 80% filling.



LPG system

# Hoses

## THERMOPLASTICS HOSES

Thermoplastic hose Faro is specifically designed to meet the quality requirements and safety standards in the global market and it is guaranteed by specialized certificates.

ATTENTION: the hose can be assembled only and exclusively with FARO FITTINGS  
Max working pressure: 30 bar  
Max working temperature: -25°C +125°C  
Application: LPG  
Certification: ECE R67-01



## INJECTORS

LPG/CNG  
system

# Injectors

For the precise dosing of the fuel "gas injection system Fobos" uses high quality and fast working gas injectors. Mainly relies on the products of the Italian company RAIL S.p.A. The company is an unconditional leader in its field, with an annual production above 500 000 pieces



## REDUCERS

LPG/CNG  
system

# Reducers

### FOBOS REDUCERS

Fobos Auto uses reducers only by established manufacturers that have proven their leadership positions and quality worldwide.

The company offers the products of: RAM, Tomasetto, Stefanelli, Magic, NIGS, Romano and others.



# Software

The software for the Fobos Gas injection system is unique with its ability to install and adjust each value of the system according to the preferences of the client and the specifics of the automobile. Thus a more flexible and precise regulation is ensured.

Attention is paid to the self-diagnostic functions of the system and the diagnostics of the vehicle which aim to make the diagnostics of all the system components fast and accessible. A system with codes for mistakes is established, similar to that of the petrol ECU.

**Possible faults:** **1** Low gas pressure; **2** Low reducer temperature; **3** Very low RPM  
**4** No signal from the ECU; **5** Malfunctioning gas pressure sensor;  
**6** Malfunctioning MAP sensor; **7** Malfunctioning reducer temperature sensor; **8** Malfunctioning gas temperature sensor; **9** The automobile starts on gas; **10** Malfunctioning button; **11** Overheating of a gas injector driver; **12** Overheating of the gas ECU; **13** Failure of the +5V pressure of the sensors; **14** Failure of the pressure of the gas injectors and valve; **15** Malfunctioning sensor of the reducer temperature (short circuit); **16** Gas Valve Trouble; **17** Individual Gas Injector Trouble (short circuit); **18** Individual Gas Injector Trouble (open circuit); **19** Switch-over To Gas due to time-out

The software of the system is extremely flexible and enables the driver to regulate the system according to individual preferences, thus meeting the expectations of even the most exacting clients providing for standards Euro 3 and Euro 4. It has been designed according to the strictest requirements in the field of gas injection systems.

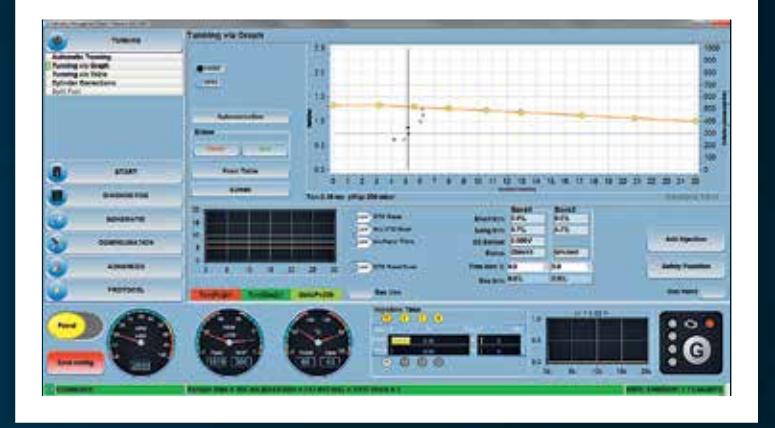
By downloading the appropriate firmware the system can be made to operate independently, not in series. In this way the fuel will be supplied according to the configured settings and engine environment.



The START page provides some basic information about the system installed on the vehicle, diagnostic trouble codes of the supported failures and gives a possibility to load existing well known settings and/or to begin a new configuration session.



There are several parameters that define how the vehicle changes back to PETROL depending on driving conditions



The FINE TUNING operation is available in two independent modes:  
• The major OBD-II parameters can be monitored continuously while the operation is in progress.



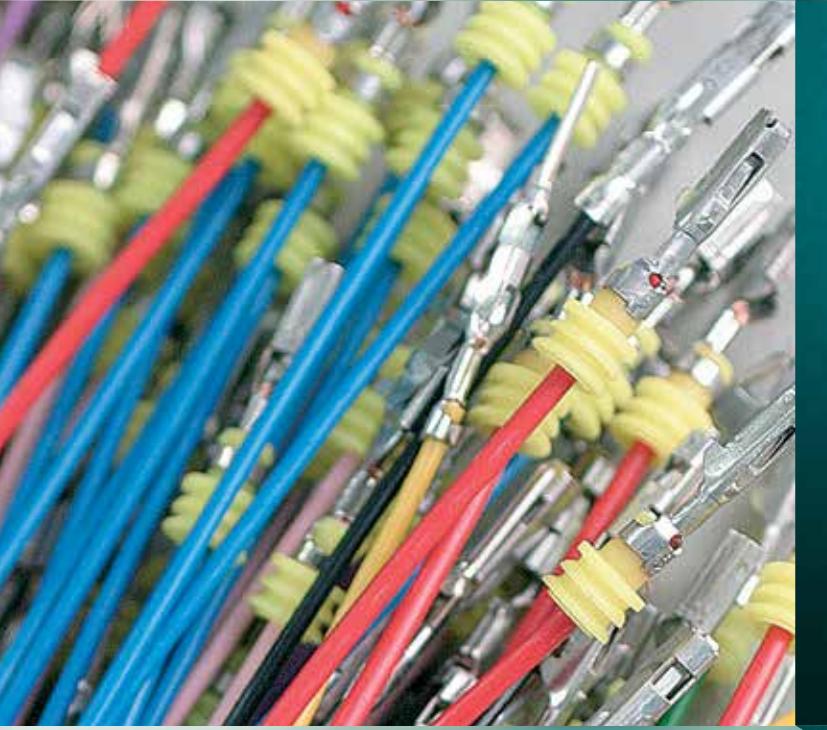
Attention is paid to the diagnostic and the self-diagnostic functions of the system which aim to make the use of the software faster and more accessible.



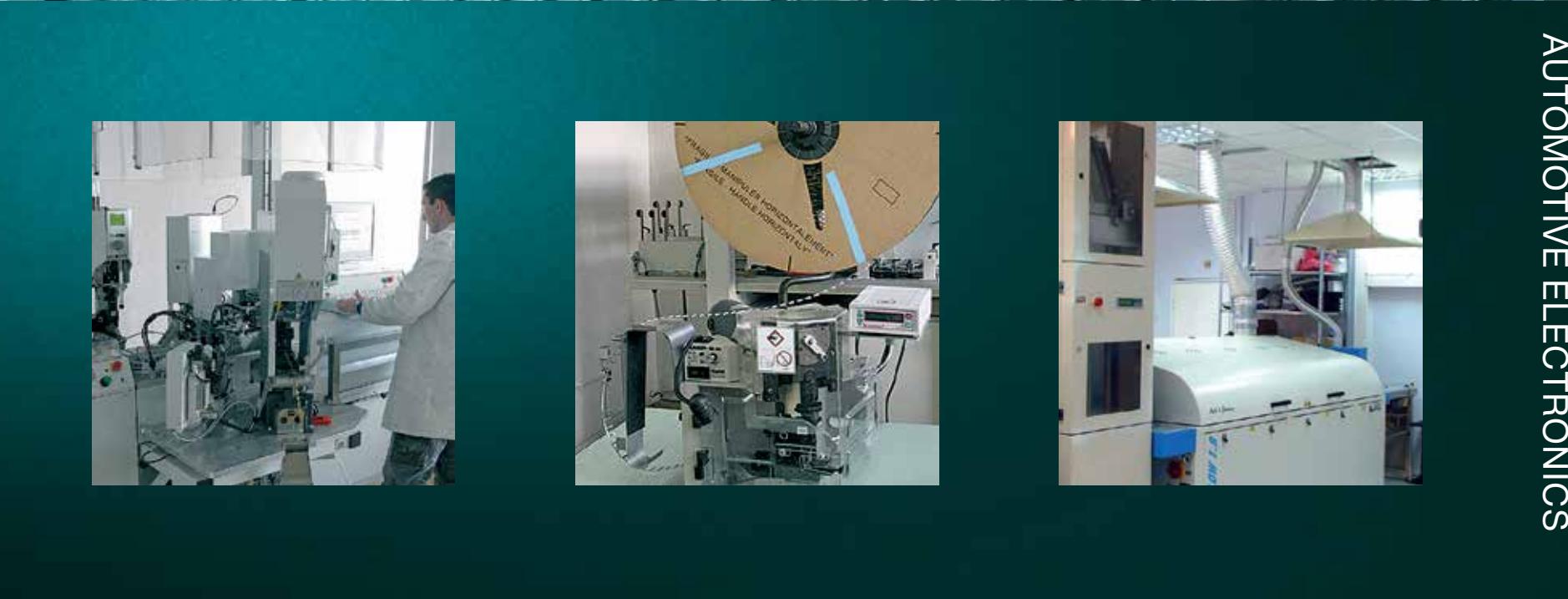
Attention is paid to the diagnostic and the self-diagnostic functions of the system which aim to make the use of the software faster and more accessible.



The self-diagnostics plays an important part in detecting faulty components. A few different tests have been developed:



CABLE CONFECTION



AUTOMOTIVE ELECTRONICS

LPG/CNG  
system

# Electronics

## GAS/PETROL SWITCH OVER RELAY TIME

Suitable for carburetor and mono injection type of automobiles. Protective function covering the system in case of an emergency cut off of the engine: The gas valves are automatically switched off up to 4 seconds after an emergency engine cut off to avoid any gas leakage even if the ignition key is turned on.

Smooth adjustment of the time needed for initial gas supply covering a wide range of 0 to 8 seconds which enables the engine to start on gas effortlessly.

Anti-noise protection protecting all input and output exits with filtrating groups.

The harness joins the commutator with a highly reliable connection which helps make the installation easier.



ELECTRONICS



## INVITATION FOR COOPERATION



# Cooperation

Fobos Auto offers a complete range of working products for installation of gas injection systems and it works only with established manufacturers and original products, as providing short delivery times.

With us you have the freedom to offer services, complying with the individual customer needs. We have an individual approach to each idea in order to achieve maximum success. We rely on flexible financial models.

Fobos Auto is an innovative company which offers comprehensive solutions for construction of gas systems of petrol cars, providing its partners the most important for every successful business - innovative products, professional service and a constant technical support. We care about our clients and highly appreciate their loyalty and feedback.

With over 20 years experience in dealing with clients, Fobos has a very good organization and technological opportunities for qualitative and rapid service.

The brand carries the identity of a product, service or company. Fobos has been imposed trademark in Bulgaria and on the international market, proved by thousands of customers and dealers in the country and worldwide.



„With us you have  
the freedom to offer  
services, complying with  
the individual customer  
needs.“



„We care about  
our clients and  
highly appreciate  
their loyalty and  
feedback.“

# FOBOS AUTO Ltd.

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## Sofia Bulgaria

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## Pleven Bulgaria

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